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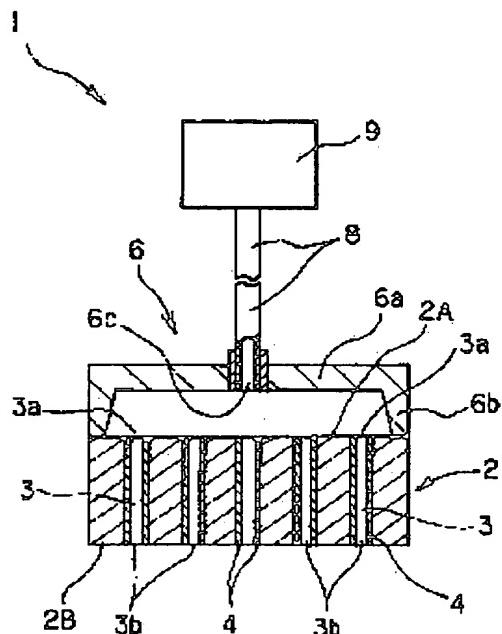
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(54) FINE PATTERN FORMING DEVICE AND METHOD

(57)Abstract:

PROBLEM TO BE SOLVED: To enable a fine pattern to be very accurately formed by a method wherein an ink path is provided respectively to fine openings provided on the surface of a silicon substrate, and an ink feed device is connected to the ink paths.
SOLUTION: A silicon substrate 2 is equipped with fine holes 3 which penetrate through it from its front surface 2A to the rear surface 2B, and the openings 3A of the fine holes 3 on a front surface side are made to come out in a gap between the silicon substrate 2 and a support member 6. The gap is formed through such a manner where the flange 6b of the support member 6 is fixed to the peripheral edge of the front surface 2A of the silicon substrate 2, an opening 6c is formed at the center of the base 6a of the support member 6, and the one end of an ink path 8 is connected to the opening 6c. The other end of the ink path 8 is connected to an ink feed device 9. By this setup, a fine pattern can be very accurately formed.



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(A) Relevance to claims

The following is a translation of passages related to claims 1-18 of the present invention.

(B) Translation of the relevant passages

[0062]

Method of Forming Micropattern of Present Invention
(First Embodiment)

Fig. 12 describes an embodiment of a method of forming a micropattern of the present invention using the above-described micropattern forming device 11 of the present invention. According to the figure, from the ink supply units 19a, 19b, and 19c of the micropattern forming device 11, ink A, ink B, and ink C are supplied via the ink paths 18, respectively, while the pattern formation object S is caused to move in a predetermined direction (direction of an arrow A) with respect to the micropattern forming device 11. This moving direction A corresponds to the direction A of aligning pores on the micropattern forming device 11. In the present case, the gap between

the silicon substrate 12 of the micropattern forming device 11 and the pattern forming object S falls within the range of about 0.1-5mm.

[0063]

With this, the pores 13 of the silicon substrate 12 discharge ink so that a pattern of stripes, in which stripes corresponding to the inks A, B, and C are repeatedly provided, is directly drawn on the pattern forming object S. In the present case, the pitch between the stripes is determined as P2. Each of these stripes is formed by ink discharged from the pores 13 provided in line. For this reason, even if an amount of ink discharged from each pore is small, the speed of forming the pattern of stripes can be increased by causing the pattern formation object S to move faster. Such a pattern of stripes is drawn with very high precision thanks to the diameter of the pores 13, and also is formed with fewer steps compared to a conventional photolithography.

[0064]

Note that, if the pattern formation object S is flexible like a resin film, it is preferable that a back-up roller is provided on the back surface of the pattern formation object S in such a manner as to face the micropattern forming device 11, and a pattern is directly drawn on the

pattern formation object S by pressing and carrying the pattern formation object S.

[0065]

(Second Embodiment)

Fig. 13 is a drawing for describing another embodiment of a method for forming a micropattern of the present invention, taking a micropattern forming device 31 of the present invention as an example. As in this figure, the micropattern forming device 31 (silicon substrate 32 in the figure) is provided at a predetermined position on a pattern formation object S, and predetermined amounts of inks are discharged onto the pattern formation object S via ink paths and pores 33. As a result, a pattern is formed on the pattern formation object. Subsequently, in a direction indicated by an arrow A, the pattern formation object S is caused to move for a predetermined length, so that a pattern identical with the above is formed thereon. Repeating these operations, a desired pattern 35 is consequently formed on the pattern formation object S. Note that, the gap between the silicon substrate 32 of the micropattern forming device 31 and the pattern forming object S falls within the range of about 0.1-5mm.

[0066]

Also note that, it is preferable that, for instance, a pattern 35 made up of the pores 33 of the micropattern forming device 31 is formed as a conductive pattern of a printed-wiring board, and a conductive paste is used as ink, so that a printed-wiring board is easily manufactured without using photolithography.